

## PATENT COOPERATION TREATY

PCT

From the INTERNATIONAL BUREAU

NOTIFICATION CONCERNING  
SUBMISSION OF PRIORITY DOCUMENTS

(PCT Administrative Instructions, Section 411)


To:

KARLSSON, Berne  
Telia Research AB  
Rudsjöterrassen 2  
S-136 80 Haninge  
SUEDE

|   |   |  |  |
|---|---|--|--|
| Date of mailing (day/month/year)<br>28 August 1997 (28.08.97) |   | IMPORTANT NOTIFICATION   |  |
| Applicant's or agent's file reference<br>Case 536 PCT         |   |  |  |
| International application No.<br>PCT/SE97/01277               | International filing date (day/month/year)<br>15 July 1997 (15.07.97) | Priority date (day/month/year)<br>02 September 1996 (02.09.96) |  |
| Applicant<br>TELIA AB et al                                   |   |  |  |

The applicant is hereby notified of the date of receipt by the International Bureau of the priority document(s) relating to the following application(s):

| <u>Priority application No.</u> | <u>Priority date:</u>  | <u>Priority country:</u> | <u>Date of receipt of priority document:</u> |
|---------------------------------|------------------------|--------------------------|--|
| 9603187-7                       | 02 Sep 1996 (02.09.96) | SE                       | 25 Aug 1997 (25.08.97)                       |

|   |  |
|---|--|
| The International Bureau of WIPO<br>34, chemin des Colombettes<br>1211 Geneva 20, Switzerland<br><br>Facsimile No.: (41-22) 740.14.35 | Authorized officer<br><br>P. Asseeff <br><br>Telephone No.: (41-22) 338.83.38 |
|---|--|

# PATENT COOPERATION TREATY

WO 98/10545  
PCT/SE97/01277

PCT

From the INTERNATIONAL BUREAU

## NOTICE INFORMING THE APPLICANT OF THE COMMUNICATION OF THE INTERNATIONAL APPLICATION TO THE DESIGNATED OFFICES

(PCT Rule 47.1(c), first sentence)

To:

KARLSSON, Berne  
Telia Research AB  
Rudsjöterrassen 2  
S-136 80 Haninge  
SUEDE

|  |   |  |  |
|--|---|--|--|
| Date of mailing (day/month/year)<br>12 March 1998 (12.03.98) |   | IMPORTANT NOTICE   |  |
| Applicant's or agent's file reference<br>Case 536 PCT        |   |  |  |
| International application No.<br>PCT/SE97/01277              | International filing date (day/month/year)<br>15 July 1997 (15.07.97) | Priority date (day/month/year)<br>02 September 1996 (02.09.96) |  |
| Applicant<br>TELIA AB et al                                  |   |  |  |

1. Notice is hereby given that the International Bureau has communicated, as provided in Article 20, the international application to the following designated Offices on the date indicated above as the date of mailing of this Notice:  
EP,NO,US

In accordance with Rule 47.1(c), third sentence, those Offices will accept the present Notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

2. The following designated Offices have waived the requirement for such a communication at this time:  
None

The communication will be made to those Offices only upon their request. Furthermore, those Offices do not require the applicant to furnish a copy of the international application (Rule 49.1(a-bis)).

3. Enclosed with this Notice is a copy of the international application as published by the International Bureau on 12 March 1998 (12.03.98) under No. WO 98/10545

### REMINDER REGARDING CHAPTER II (Article 31(2)(a) and Rule 54.2)

If the applicant wishes to postpone entry into the national phase until 30 months (or later in some Offices) from the priority date, a demand for international preliminary examination must be filed with the competent International Preliminary Examining Authority before the expiration of 19 months from the priority date.

It is the applicant's sole responsibility to monitor the 19-month time limit.

Note that only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination.

### REMINDER REGARDING ENTRY INTO THE NATIONAL PHASE (Article 22 or 39(1))

If the applicant wishes to proceed with the international application in the national phase, he must, within 20 months or 30 months, or later in some Offices, perform the acts referred to therein before each designated or elected Office.

For further important information on the time limits and acts to be performed for entering the national phase, see the Annex to Form PCT/IB/301 (Notification of Receipt of Record Copy) and Volume II of the PCT Applicant's Guide.

|  |   |
|--|---|
| The International Bureau of WIPO<br>34, chemin des Colombettes<br>1211 Geneva 20, Switzerland<br>Facsimile No. (41-22) 740.14.35 | Authorized officer<br>J. Zahra<br>Telephone No. (41-22) 338.83.38 |
|--|---|

**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

|    |                          |    |  |    |  |    |                          |
|----|--------------------------|----|--|----|--|----|--------------------------|
| AL | Albania                  | ES | Spain                                    | LS | Lesotho                                      | SI | Slovenia                 |
| AM | Armenia                  | FI | Finland                                  | LT | Lithuania                                    | SK | Slovakia                 |
| AT | Austria                  | FR | France                                   | LU | Luxembourg                                   | SN | Senegal                  |
| AU | Australia                | GA | Gabon                                    | LV | Latvia                                       | SZ | Swaziland                |
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| BA | Bosnia and Herzegovina   | GE | Georgia                                  | MD | Republic of Moldova                          | TG | Togo                     |
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| BR | Brazil                   | IL | Israel                                   | MW | Malawi                                       | UG | Uganda                   |
| BY | Belarus                  | IS | Iceland                                  | MX | Mexico                                       | US | United States of America |
| CA | Canada                   | IT | Italy                                    | NE | Niger  | UZ | Uzbekistan               |
| CF | Central African Republic | JP | Japan                                    | NL | Netherlands                                  | VN | Viet Nam                 |
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| CH | Switzerland              | KG | Kyrgyzstan                               | NZ | New Zealand                                  | ZW | Zimbabwe                 |
| CI | Côte d'Ivoire            | KP | Democratic People's<br>Republic of Korea | PL | Poland                                       |    |                          |
| CM | Cameroon                 | KR | Republic of Korea                        | PT | Portugal                                     |    |                          |
| CN | China                    | KZ | Kazakstan                                | RO | Romania                                      |    |                          |
| CU | Cuba                     | LC | Saint Lucia                              | RU | Russian Federation                           |    |                          |
| CZ | Czech Republic           | LI | Liechtenstein                            | SD | Sudan  |    |                          |
| DE | Germany                  | LK | Sri Lanka                                | SE | Sweden                                       |    |                          |
| DK | Denmark                  | LR | Liberia                                  | SG | Singapore                                    |    |                          |
| EE | Estonia                  |    |  |    |  |    |                          |

## PATENT COOPERATION TREATY

## PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

|  |   |  |
|--|---|--|
| Applicant's or agent's file reference<br>Case 536 PCT  | <b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416) |  |
| International application No.<br>PCT/SE97/01277  | International filing date (day/month/year)<br>15.07.1997  | Priority date (day/month/year)<br>02.09.1996 |
| International Patent Classification (IPC) or national classification and IPC <sub>6</sub><br>H 04 L 5/06, H 04 L 27/26 |   |  |
| Applicant<br>Telia AB (publ) et al   |   |  |

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 4 sheets, including this cover sheet.
- ☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of \_\_\_\_\_ sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

|  |   |
|--|---|
| Date of submission of the demand<br><br>26.03.1998   | Date of completion of this report<br><br>25.01.1999                         |
| Name and mailing address of the IPEA/SE<br>Patent- och registreringsverket<br>Box 5055<br>S-102 42 STOCKHOLM<br>Facsimile No. 08-667 72 88 | Authorized officer /<br><br>Christina Halldin<br>Telephone No. 08-782 25 00 |

Form PCT/IPEA/409 (cover sheet) (January 1994)

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/SE97/01277

## I Basis of the report

1. This report has been drawn on the basis of *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.)*:

- ☒ the international application as originally filed.
- ☐ the description, pages \_\_\_\_\_, as originally filed,  
 pages \_\_\_\_\_, filed with the demand,  
 pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_,  
 pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_.
- ☐ the claims, Nos. \_\_\_\_\_, as originally filed,  
 Nos. \_\_\_\_\_, as amended under Article 19,  
 Nos. \_\_\_\_\_, filed with the demand,  
 Nos. \_\_\_\_\_, filed with the letter of \_\_\_\_\_,  
 Nos. \_\_\_\_\_, filed with the letter of \_\_\_\_\_.
- ☐ the drawings, sheets/fig \_\_\_\_\_, as originally filed,  
 sheets/fig \_\_\_\_\_, filed with the demand  
 sheets/fig \_\_\_\_\_, filed with the letter of \_\_\_\_\_,  
 sheets/fig \_\_\_\_\_, filed with the letter of \_\_\_\_\_.

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages \_\_\_\_\_
- ☐ the claims. Nos. \_\_\_\_\_
- ☐ the drawings. sheets/fig \_\_\_\_\_

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the supplemental Box (Rule 70.2(c)).

4. Additional observations, if necessary:

International application No.

PCT/SE97/01277

**V. Resoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

## 1. Statement

|                               |        |      |     |
|-------------------------------|--------|------|-----|
| Novelty (N)                   | Claims | 1-35 | YES |
|                               | Claims |      | NO  |
| Inventive step (IS)           | Claims | 1-35 | YES |
|                               | Claims |      | NO  |
| Industrial applicability (IA) | Claims | 1-35 | YES |
|                               | Claims |      | NO  |

## 2. Citations and explanations

The claimed invention relates to a method and a multi-carrier transmission system that comprises transmission and reception means to exchange control information in order to dynamically change the number of coded/decoded bits per carrier wave. Each carrier wave comprises a channel, such that the number of bits per symbol, or bit loading, varies between channels and, within a channel, in time, so that each channel has an associated bit loading parameter. In operation, the multiple carrier wave transmission system is arranged synchronously to update, on the first and second transceivers, the bit loading parameters associated with each channel by transmission of data over a control channel.

The control channel is established at the system start, on a predetermined channel in the multiplicity of carrier waves, whose identity is known by the first and second transceivers. The control channel, after the start, is altered from the predetermined channel to a further channel that is selected by the first transceiver on the basis of the channel characteristics.

The following documents have been cited in the International Search Report:

D1: WO 9 602 990 A2,  
D2: DE 4 330 665 A1

D1 discloses a method for pre-FFT synchronisation of an OFDM transmission system in which data is transmitted in a frame structure containing frames and super-frames, each super-frame containing a predetermined number of frames. At least one frame in each super frame carries a chirp signal for use in synchronising a receiver with a transmitter. A received signal is sampled and digitised to form a sequence of binary words representing the received signal.

...../.....

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/SE97/01277

**Supplemental Box**

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: V

The digitised samples are correlated with a stored digital representation of the chirp signal. Each binary word represents a sample of the received signal including a sign bit or most significant bit. The correlation is performed using only the sign bits or the most significant bits of the binary word.

D2 discloses a transmission method that involves division of the signal stream between a number of carriers, with corresponding increase of the symbol length and a synchronisation symbol covering all carriers. The power of signal during part of the symbol duration of the synchronisation symbol is zero, the signal component of the synchronisation symbol including at least one autocorrelation bit formation. The information sequences of the bit information provided by the carriers are arranged in order from the highest frequency to the lowest frequency, or vice versa. The receiver provides coarse synchronisation via the partial symbol with zero power, with subsequent evaluation of the signal components of the synchronisation symbol, for accurate synchronisation.

However, none of the cited documents refer to the system and method for reconfiguration of the transmitted number of bits per symbol for each single carrier wave as claimed in the claimed invention. Therefore, in view of D1 and D2 what has been claimed in claims 1 - 35 is considered to be new and to involve an inventive step.

The invention according to all claims is considered to have industrial applicability.

## PATENT COOPERATION TREATY

## PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

|   |  |  |
|---|--|--|
| Applicant's or agent's file reference<br>Case 536 PCT | FOR FURTHER<br>ACTION                                      | see Notification of Transmittal of International Search Report<br>(Form PCT/ISA/220) as well as, where applicable, item 5 below. |
| International application No.<br>PCT/SE 97/01277      | International filing date (day/month/year)<br>15 July 1997 | (Earliest) Priority Date (day/month/year)<br>2 Sept 1996   |
| Applicant<br>Telia AB et al                           |  |  |

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. ☐ Certain claims were found unsearchable (See Box I).
2. ☐ Unity of invention is lacking (See Box II).
3. ☐ The international application contains disclosure of a nucleotide and/or amino acid sequence listing and the international search was carried out on the basis of the sequence listing
  - ☐ filed with the international application.
  - ☐ furnished by the applicant separately from the international application,
    - ☐ but not accompanied by a statement to the effect that it did not include matter going beyond the disclosure in the international application as filed.
  - ☐ transcribed by this Authority.
4. With regard to the title, ☒ the text is approved as submitted by the applicant.  
☐ the text has been established by this Authority to read as follows:
5. With regard to the abstract,
  - ☐ the text is approved as submitted by the applicant.
  - ☒ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
6. The figure of the drawings to be published with the abstract is:  
Figure No. 1 ☒ as suggested by the applicant. ☐ None of the figures.  
☐ because the applicant failed to suggest a figure.  
☐ because this figure better characterizes the invention.



Box III TEXT OF THE ABSTRACT (Continuation of Item 5 of the first sheet)

ABSTRACTImprovements in, or Relating to,  
Multi-carrier Transmission Systems

In a multi-carrier system there is always a need to exchange control information between a transmitter and a receiver. This information is generated in the receiver and terminated in the transmitter. This information contains data on the instantaneous characteristics of the channel and information about system change decisions needed to handle the changes in channel characteristics.

In systems that use bit-loading techniques the number of transmitted bits per symbol is adapted, or regulated, to the signal-to-noise ratio (SNR) of the current carrier wave. This regulation dynamically affects, in time, the total bandwidth of the system. This variation in bandwidth leads to an absolute system requirement for synchronous configuration of the transmitter and the receiver, in terms of the number of coded/decoded bits per symbol and carrier wave. If this requirement is not met the system will be unable to maintain a connection.

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 97/01277

## A. CLASSIFICATION OF SUBJECT MATTER

IPC6: H04L 5/06, H04L 27/26

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                 | Relevant to claim No. |
|-----------|--|-----------------------|
| A         | WO 9602990 A2 (HD-DIVINE), 1 February 1996<br>(01.02.96), abstract<br>--                           | 1-35                  |
| A         | DE 4330665 A1 (DEUTSCHE THOMSON-BRANDT GMBH),<br>16 March 1995 (16.03.95), abstract<br>--<br>----- | 1-35                  |

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

## \* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

15 December 1997

Date of mailing of the international search report

22-12-1997

Name and mailing address of the ISA/  
Swedish Patent Office  
Box 5055, S-102 42 STOCKHOLM  
Facsimile No. +46 8 666 02 86

Authorized officer

MIKAEL SOLLERHED  
Telephone No. +46 8 782 25 00

**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

02/12/97

International application No.  
PCT/SE 97/01277

| Patent document<br>cited in search report |         |    | Publication<br>date | Patent family<br>member(s) |           | Publication<br>date |
|---|---------|----|---------------------|----------------------------|-----------|---------------------|
| WO  | 9602990 | A2 | 01/02/96            | AU                         | 2994495 A | 16/02/96            |
|   |         |    |                     | SE                         | 9402464 A | 14/01/96            |
| DE  | 4330665 | A1 | 16/03/95            | CN                         | 1130966 A | 11/09/96            |
|   |         |    |                     | EP                         | 0717894 A | 26/06/96            |
|   |         |    |                     | JP                         | 9502318 T | 04/03/97            |
|   |         |    |                     | WO                         | 9507581 A | 16/03/95            |

# PATENT COOPERATION TREATY

## PCT

### NOTIFICATION OF THE RECORDING OF A CHANGE

(PCT Rule 92bis.1 and  
Administrative Instructions, Section 422)

From the INTERNATIONAL BUREAU

To:

PRAGSTEN, Rolf  
Telia Research AB  
Vitsandsgatan 9  
S-123 86 Farsta  
SUEDE

|  |                               |
|--|-------------------------------|
| <b>Date of mailing</b> (day/month/year)<br>24 April 1998 (24.04.98)          | <b>IMPORTANT NOTIFICATION</b> |
| <b>Applicant's or agent's file reference</b><br>Case 536 PCT                 |                               |
| <b>International application No.</b><br>PCT/SE97/01277                       |                               |
| <b>International filing date</b> (day/month/year)<br>15 July 1997 (15.07.97) |                               |

|  |   |
|--|---|
| 1. The following indications appeared on record concerning:  |   |
| <input type="checkbox"/> the applicant   | <input type="checkbox"/> the inventor                             |
| <input checked="" type="checkbox"/> the agent  | <input type="checkbox"/> the common representative                |
| <b>Name and Address</b><br>KARLSSON, Berne<br>Telia Research AB<br>Rudsjöterrassen 2<br>S-136 80 Haninge<br>Sweden | <b>State of Nationality</b>                                       |
|  | <b>State of Residence</b>   |
|  | <b>Telephone No.</b><br>46 8 707 52 82                            |
|  | <b>Facsimile No.</b><br>46 8 707 52 81                            |
| <b>Teleprinter No.</b>   |   |
| 2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:  |   |
| <input checked="" type="checkbox"/> the person   | <input checked="" type="checkbox"/> the name                      |
| <input checked="" type="checkbox"/> the address  | <input type="checkbox"/> the nationality                          |
| <input type="checkbox"/> the residence   |   |
| <b>Name and Address</b><br>PRAGSTEN, Rolf<br>Telia Research AB<br>Vitsandsgatan 9<br>S-123 86 Farsta<br>Sweden     | <b>State of Nationality</b>                                       |
|  | <b>State of Residence</b>   |
|  | <b>Telephone No.</b><br>46 8 713 83 27                            |
|  | <b>Facsimile No.</b><br>46 8 713 83 21                            |
| <b>Teleprinter No.</b>   |   |
| 3. Further observations, if necessary:   |   |
| 4. A copy of this notification has been sent to:   |   |
| <input checked="" type="checkbox"/> the receiving Office   | <input type="checkbox"/> the designated Offices concerned         |
| <input type="checkbox"/> the International Searching Authority   | <input checked="" type="checkbox"/> the elected Offices concerned |
| <input checked="" type="checkbox"/> the International Preliminary Examining Authority                              | <input type="checkbox"/> other:                                   |

The International Bureau of WIPO  
34, chemin des Colombettes  
1211 Geneva 20, Switzerland

Authorized officer

Aino Metcalfe

Best Available Copy

## PATENT COOPERATION TREATY

PCT

## NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

United States Patent and Trademark  
Office  
(Box PCT)  
Crystal Plaza 2  
Washington, DC 20231  
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

|  |   |
|--|---|
| <b>Date of mailing</b> (day/month/year)<br>24 April 1998 (24.04.98)          |   |
| <b>International application No.</b><br>PCT/SE97/01277                       | <b>Applicant's or agent's file reference</b><br>Case 536 PCT          |
| <b>International filing date</b> (day/month/year)<br>15 July 1997 (15.07.97) | <b>Priority date</b> (day/month/year)<br>02 September 1996 (02.09.96) |
| <b>Applicant</b><br>ISAKSSON, Mikael et al                                   |   |

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:

26 March 1998 (26.03.98)

☐ in a notice effecting later election filed with the International Bureau on:2. The election ☒ was☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO  
34, chemin des Colombettes  
1211 Geneva 20, Switzerland

Authorized officer

Aino Metcalfe

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